

REMARKS

The Amendment After Final Rejection submitted February 2, 2004, in the above-identified application, refused entry as set forth in the Advisory Action mailed February 26, 2004, is noted. Also to be noted is the concurrently filed RCE Transmittal for the above-identified application, for which the present amendments constitute the necessary Submission Under 37 CFR § 1.114 therefor. It is also to be noted that in the concurrently filed RCE Transmittal, Applicants do not request entry of the Amendment After Final Rejection filed February 2, 2004, the present amendments constituting the Submission Under 37 CFR § 1.114 for the concurrently filed RCE Transmittal.

By the present amendments, Applicants are amending their claims as in the Amendment After Final Rejection filed February 24, 2004, are further amending claims 24 and 30, and are adding new claims 35-38 to the application.

Specifically, noting that in the Amendment submitted February 2, 2004, Applicants amended each of claims 24 and 30 to recite that the extended part is adapted to be subjected to friction stir welding together with another frame member, note that by the present amendments, Applicants are amending claims 24 and 30 to recite that the extended part is adapted to be subjected to friction stir welding together with "at least one plate of" the another extruded frame member, with the extended part of the extruded frame member being arranged to overlap this at least one plate of the another frame member.

Of the newly added claims, 35 and 36, dependent respectively on claims 24 and 30, recite that the extended part is arranged to overlies the at least one plate of the another extruded frame member, relative to a direction in which friction stir

welding of the extended part together with the at least one plate of the another extruded frame member is carried out. Claims 37 and 38, dependent respectively on claims 24 and 30, recite that the thickened part is a part that only protrudes above the at least one plate of the extruded frame member, relative to a direction in which friction stir welding of the extended part together with the at least one plate of the another extruded frame member is carried out.

In view of the present amendment of claim 25, to recite said "extended" part, it is respectfully submitted that the rejection of claims 21 and 25 under the second paragraph of 35 U.S.C. § 112 is moot.

Applicants respectfully submit that all of the claims present in the above-identified application patentably distinguish over the teachings of the reference applied by the Examiner in rejecting claims in the Office Action mailed October 3, 2003, that is, the teachings of European Patent Application No. 797,043 (Aota, et al.), under the provisions of 35 U.S.C. § 102 and 35 U.S.C. § 103.

It is respectfully submitted that this reference as applied by the Examiner would have neither taught nor would have suggested such an extruded frame member as in the present claims, having the thickened part which protrudes from a side of the at least one plate of the extruded frame member, in a thickness direction of the at least one plate of the extruded frame member, with this extruded frame member further including an extended part extending from the thickened part, substantially in parallel to the at least one plate of the extruded frame member, and extending beyond the at least one end portion of the width of the at least one plate of the extruded frame member, in a direction of the width of the at least one plate of the extruded frame member, this extended part being provided continuously and

outwardly from the thickened part, the extended part being adapted to be subjected to friction stir welding together with at least one plate of the another extruded frame member, and with this extended part being arranged to overlap the at least one plate of the another extruded frame member when the extruded frame member is arranged adjacent the another extruded frame member such that the friction stir welding can be carried out. See claim 24; note also claim 30.

In addition, it is respectfully submitted that the applied reference would have neither taught nor would have suggested such extruded frame member as discussed previously, having the thickened and extended parts as discussed in the immediately prior paragraph, and wherein at an end portion of the at least one plate of the extruded frame member and under the extended part of the extruded frame member, the at least one plate of the another extruded frame member is adapted to be positioned adjacent to the extruded frame member, with the end portion of the at least one plate of the extruded frame member being adapted to be abutted to an end side of the at least one plate of the another extruded frame member, for carrying out the friction stir welding of the extruded frame member and the another extruded frame member. Note claim 30.

Moreover, it is respectfully submitted that the applied reference would have neither disclosed nor would have suggested such an extruded frame member as in the present claims, having the thickened part and extended part as discussed previously in connection with independent claims 24 and 30, and having additional features as in dependent claims herein, including (but not limited) wherein each of an outer surface of the thickened part and an outer surface of the extended part, in the width direction, are coplanar (see claims 18 and 33); and/or wherein the extended

part extends upward in the thickness direction of the at least one plate of the extruded frame member to a level above a level of this plate (see claims 29 and 34); and/or wherein the thickened part has a width that is substantially equal to a width of the extended part (see claims 21 and 22); and/or wherein the at least one plate of the extruded frame member, and the thickened and extended parts, are formed integrally as one body (see claim 17); and/or wherein a side surface of the extended part, furthest from the thickened part, and a side surface of the thickened part, furthest from the extended part, extend obliquely (see claim 23); and/or wherein a triangular-shaped groove is provided, with friction stir welding being carried out through this groove (see claim 25); and/or wherein during the friction stir welding material of the thickened part and of the extended part is adapted to fill up any gaps, between the at least one plate of the extruded frame member and the at least one plate of the another extruded frame member, which exist when the extruded frame member abuts the another extruded frame member (see claim 20).

Furthermore, it is respectfully submitted that the applied reference would have neither disclosed nor would have suggested such an extruded frame member as in the present claims, having the thickened part and extended part as discussed previously in connection with independent claims 24 and 30, and having other features as in dependent claims 35-38, including wherein the extended part is arranged to overlie the at least one plate of the another extruded frame member (see claims 35 and 36), or wherein the thickened part is a part that only protrudes above the at least one plate of the extruded frame member (see claims 37 and 38), relative to a direction in which friction stir welding of the extended part together with the at least one plate of the another extruded frame member is carried out.

The present invention is directed to an extruded frame member suitable for use in friction stir welding. In particular, the present invention involves such extruded frame member, which can be formed simply and efficiently, whereby a raised portion need only be provided to one of the two members being joined by friction stir welding, yet wherein sufficient material is provided to avoid any resulting dents in the friction stir welded structure. That is, according to the present invention, a raised portion provided to one of the two frame members being joined by friction stir welding can be sufficient to avoid the need of both of the frame members having thickened portions.

Objectives according to the present invention are achieved utilizing the combination of thickened part and extended part as in the present claims, with the extended part being provided continuously and outwardly from the thickened part and being arranged to overlap at least one plate of another extruded frame member when the extruded frame member is arranged adjacent this another extruded frame member such that the friction stir welding can be carried out. That is, by use of such thickened and extended parts, only one of the two members being friction stir welded need have a raised portion, formed by extrusion. Moreover, the extended part can easily be provided overlapping (more particularly, overlying) the another extruded frame member being joined by friction stir welding, when such extended part is provided continuously and outwardly from the thickened part. The extended part is adapted to be subjected to the friction stir welding, providing material during the friction stir welding to avoid dents in the welded structure, caused by the friction stir welding.

In addition, by providing the triangular-shaped groove, positioning of the rotary tool during the friction stir welding can easily, accurately and effectively be achieved.

Aota, et al. discloses a friction stir welding method suitably applied to panel welding used, for example, for aluminum alloys to be used in railway cars and buildings. In the embodiment shown in Fig. 1 of Aota, et al., a joint configuration of abutting types between hollow shape members 31, 32 as panels is shown. The hollow shape members 31, 32 have vertical plates 36, 36 at their ends in the width direction. On the extension of the interface between the vertical plates 36, 36 lies the center of a projection 52 of a rotary tool used in friction stir welding. The vertical plates 36, 36 have a stiffness strong enough to sustain the downward force applied to the hollow shape members during the friction stir welding, with the vertical plates 36 being perpendicular to two plates 33, 34. See column 2, lines 39-43 and 47-52. Note also column 3, lines 11-15. In another embodiment shown in Fig. 7 of Aota, et al., in the joint region of the two hollow shape members 31, 32, each of these two hollow shape members is respectively provided with raised portions 37a, 38a protruding outside, which makes the joint region thick, the heights of the raised portions 37a, 38a being equal. See column 5, lines 37-42. In the joint configuration of Fig. 7, the rotary tool 50 plasticizes the raised portions 37a, 38a and forces them downward making up for lost volume of material 41. See column 5, lines 52-55. This structure of Fig. 7 in Aota, et al. includes projecting pieces 37, which project from plate 36. Note Fig. 5 and the description in column 5, lines 14-23 of Aota, et al. These projecting pieces 37 are provided to give rigidity to sustain the vertical force, e.g., during the friction stir welding. See column 5, lines 19-23.

It is respectfully submitted that Aota, et al. would have neither disclosed nor would have suggested the frame member as in the present claims, including the thickened and extending parts, particularly wherein the extended part extends from the thickened part, substantially in parallel to the at least one plate of the extruded frame member, and extends beyond the at least one end portion of the at least one plate of the extruded frame member, the extended part being provided continuously and outwardly from the thickened part and being arranged to overlap at least one plate of the another extruded frame member. Clearly, as can be seen, for example, in Fig. 7 of Aota, et al., the projecting piece 38 having raised portion 38a overlaps the projecting piece 37 of the frame member 31, and it is respectfully submitted that this disclosure in Aota, et al. would have taught away from the overlap as in the present claims, wherein the extended part overlaps the at least one plate of the another extruded frame member with which the extended part is subjected to friction stir welding.

Applicants also respectfully traverse the contention by the Examiner that in Aota et al., an extruded part extends "from the thickened part", substantially in parallel to the at least one plate of the extruded frame member. As can be seen, for example, in Fig. 7 of Aota, et al., the structure represented by reference character 37 extends from vertical plate 36, not raised portion 37a and not even from plate 33; and, accordingly, it is respectfully submitted that the structure as in, for example, Fig. 7 of Aota, et al. would have taught away from that aspect of the present invention having the extended part extending from the thickened part as in the

present invention. That is, it is respectfully submitted that the extruded part extends from the vertical plate 36 in Aota, et al., not from the thickened part.

That one of ordinary skill in the art would have construed the structure represented by reference character 37 in Aota, et al. as extending from vertical plate 36 can be seen in construing the teachings of Aota, et al. as a whole, as required under 35 U.S.C. § 102 and 35 U.S.C. § 103. That is, note that in Fig. 3 vertical plate 36 connecting plates 33 and 34 has a thickened portion, and has recessed corners in the vertical direction so as to receive the ends of projecting pieces 38, 38 of the hollow shape member 32. See column 3, lines 36-42. Correspondingly, in Fig. 7, the vertical plate 36 includes a narrower portion between the projecting pieces 37 of Fig. 7 (note also Fig. 5); taking the teachings of Aota, et al., as a whole, it is respectfully submitted that one of ordinary skill in the art would have construed the projecting pieces 37 as part of the vertical plate 36, reference being had in particular to Figs. 3, 5 and 7, rather than as extending from the thickened part as in the present invention.

Furthermore, again referring to the structure represented by reference characters 37a and 37 in Aota, et al., clearly the teachings thereof would have neither disclosed nor would have suggested, and in fact would have taught away from, wherein an outer surface of the thickened and extended parts, in the width direction, are coplanar (see claims 18 and 33); or wherein the extended part extends to a level higher than the level of the plate (see claims 29 and 34); or wherein side surfaces of the thickened and extended parts are oblique (see claim 23), as well as the other features discussed above.

On page 2 of the Advisory Action mailed February 26, 2004, the Examiner contends that in Aota, et al. the thickened part is not just the raised portion 37a but also includes the portion beneath 37a (apparently contending that the projecting piece 37 extends from "the portion beneath 37a"). However, it is respectfully submitted that this is an improper interpretation of the teachings of Aota, et al., as can be seen from the express teachings of Aota, et al. Thus, it is noted that Aota, et al., discloses, in connection with Fig. 5 (Fig. 7 being disclosed as a variation of the embodiment of Fig. 5), that there is virtually no vertical plate 36 immediately below the corners 33b, 34b, and that the right end of the vertical plate 36 lies on the extension of the corners 33b, 34b, with the end portion of the hollow shape member being given a rigidity to sustain the vertical force by making the lower projecting piece 37 at the joint thicker and increasing the size of the arcs extending from the front ends of the projecting pieces 37 to the plate 36. Note column 5, lines 14-23 of Aota, et al. It is respectfully submitted that this disclosure teaches extension of projecting pieces 37 from the vertical plates, and would have neither disclosed nor would have suggested extended parts extending from the thickened part as in the present claims.

Furthermore, it is emphasized that according to the present invention the thickened and extended parts provide material to fill in, e.g., gaps between the extruded frame member and the another extruded frame member when positioned for friction stir welding. Compare with projecting pieces 37 in Aota, et al., providing rigidity to support a pressing force produced during the friction stir welding. It is respectfully submitted that the structure of Aota, et al., including the projecting pieces 37, would have neither disclosed nor would have suggested the present invention,

including the thickened and extended parts, and function thereof, and advantages thereof, as discussed in the foregoing.

It must be emphasized that in the structure shown in Fig. 7 of Aota, et al., each of frame members 31 and 32 has raised portions, respectively represented by reference characters 37a and 38a. This structure as in Fig. 7 is just such structure, wherein each of the frame members joined by friction stir welding has raised portions, which can be avoided according to the present invention, wherein only one of the two frame members need to include the raised portion, which can extend (forming the extended part) so as to overlap the other of the two frame members (e.g., providing the thickened part and the extended part).

Moreover, as seen in Fig. 7 of Aota, et al., the raised portion 38a overlaps projecting portion 37, rather than the overlapping (or overlying) as in the present claims. Achieving such overlap as in the present claims, only one of the two members being friction stir welded need have a raised portion, and the other need not have any thickened part, providing advantages as discussed previously. Clearly, Aota, et al. would have neither taught nor would have suggested, and, in fact, would have taught away from, the presently claimed subject matter, and advantages thereof.

Applicants respectfully traverse the contention by the Examiner on page 3 of the Office Action mailed October 3, 2003, that Aota, et al. discloses an extruded frame member including an extended part extending from the thickened part. As indicated previously, it is respectfully submitted that one of ordinary skill in the art would have construed the teachings of Aota, et al. as describing projections 37 extending from vertical plate 36; and it is respectfully submitted that this reference

would have neither disclosed nor would have suggested, and in fact would have taught away from, the presently claimed invention, including the extended part extending from the thickened part.

Applicants respectfully traverse the conclusion by the Examiner on page 3 of the Office Action mailed October 3, 2003, that the extended part of the extruded frame member in Aota, et al. is provided continuously and outwardly from the thickened part of the at least one end portion of a width of the at least one plate of the extruded frame member. It is respectfully submitted that there is a discontinuity between the plate and projection 37 in Aota, et al.; and, in any event, clearly projection 37 of Aota, et al. does not extend "continuously" from the thickened part.

The additional contention by the Examiner in the sole full paragraph on page 6 of the Office Action mailed October 3, 2003, that in Aota, et al. the thickened part is not just the raised portion 37a but also includes the portion beneath 37a, is noted. Even assuming, arguendo, that the thickened part includes somewhat of a portion beneath raised portion 37a, it is respectfully submitted that such portion does not extend to vertical plate 36, from which projecting piece 37 extends.

Moreover, it is emphasized that the present claims recite that the extended part is provided continuously and outwardly from the thickened part of the at least one end portion of a width of the at least one plate of the extruded frame member. It is respectfully submitted that the projecting piece 37 of Fig. 7 of Aota, et al. (and as is also in Fig. 5 of Aota, et al.) is not provided continuously from the thickened part (raised portion 37a in Aota, et al.) as in the present claims.

Applicants respectfully traverse the additional contention by the Examiner on page 3 of the Office Action mailed October 3, 2003, that in Aota, et al. the extended

part of the extruded frame member is arranged to overlap at least one plate of the another extruded frame member when the extruded frame member is arranged adjacent the another extruded frame member such that the friction stir welding can be carried out, as in the present claims. In this regard, it is again emphasized that in Fig. 7 of Aota, et al. projecting piece 38 of the other hollow shape member 32 overlaps projecting piece 37 of hollow shape member 31, not the other way around. It is respectfully submitted that construing projecting piece 37 of hollow shape member 31 as overlapping raised portion 38a of hollow shape member 32 would destroy projecting piece 37 for its intended purpose of providing rigidity and support for the friction stir welding, and thus constitutes an improper interpretation of the teachings of Aota, et al.

The discussion by the Examiner as to the meaning of "overlap", in the paragraph bridging pages 5 and 6 of the Office Action mailed October 3, 2003, is noted. Relative to direction of friction stir welding, clearly raised portion 38a in Aota, et al. overlaps projecting pieces 37, and not the other way around.

In any event, attention is respectfully directed to newly added claims 35-38. Claims 35 and 36 recite that the extended part is arranged to overlie the at least one plate of the another extruded frame member, and claims 37 and 38 recite that the thickened part is a part that only protrudes above the at least one plate of the extruded frame member, relative to a direction in which friction stir welding of the extended part together with the at least on plate of the another extruded frame member is carried out. It is respectfully submitted that Aota, et al. would have neither taught nor would have suggested such structure and positioning thereof,

relative to the direction in which friction stir welding is carried out, and advantages thereof, as in the present invention.

Applicants respectfully traverse the conclusion by the Examiner, in connection with claims 18 and 33, that an outer surface of the thickened part and an outer surface of the extended part in Aota, et al. are coplanar. As construed by the Examiner, the outer surface of projecting piece 37 must be below the surface of the raised portion 37a, in order to provide a seat for hollow frame member 32; and thus it is respectfully submitted that Aota, et al. teaches away from the outer surface of the thickened part and extended part being coplanar.

Applicants respectfully traverse the conclusion by the Examiner in the sentence bridging pages 3 and 4 of the Office Action mailed October 3, 2003, that in Fig. 7 the thickened part 37a has a width that is substantially equal to a width of the extended part. As can be seen in Fig. 7, widths of raised portion 37a and 38a are substantially the same, and projection piece 37 extends in the width direction beyond raised portion 38a. Contrary to the conclusion by the Examiner, it is respectfully submitted that Aota, et al. teaches away from widths of the thickened and extending parts as in the present claims.

Applicants respectfully traverse the conclusion by the Examiner that, in connection with claim 23, side surfaces of the extended part, furthest from the thickened part, and of the thickened part, furthest from the extended part, extend obliquely. It is respectfully submitted that in Fig. 7 of Aota, et al., the side surfaces extend substantially vertically. In any event, it is respectfully submitted that Fig. 7 of Aota, et al. is a schematic drawing, and would have neither disclosed nor would have

suggested the oblique extension of side surfaces of the extended and thickened parts as in claim 23.

The contention by the Examiner on page 4 of the Office Action mailed October 3, 2003, in connection with claims 29 and 34, that the extended part (represented by reference character 37 in Fig. 7 of Aota, et al.) extends upward in the thickness direction of the at least one plate to a level above a level of the at least one plate of the extruded frame member, is respectfully traversed. Clearly, in Fig. 7 projecting piece 37 extends below plate 33 of hollow frame member 32, and must extend below plate 33 of hollow frame member 32 in order to provide a seat for hollow frame member 32.

Applicants respectfully traverse the conclusion by the Examiner that Aota, et al. shows a groove. In this regard, the Examiner has referred to reference character 45 in Fig. 8 of Aota, et al. as such groove. However, reference character 45 in Aota, et al. represents a weld bead after welding. It is respectfully submitted that the Examiner has unreasonably interpreted the teachings of Aota, et al., in construing the structure of reference character 45 as a groove.

In addition, note that in Fig. 8 there are no thickened parts; looking to Fig. 8, the structure shown therein would have neither taught nor would have suggested the presently claimed invention, including the groove and advantage thereof, much less wherein the groove is of a triangular shape.

The contention by the Examiner in the paragraph bridging pages 6 and 7 of the Office Action mailed October 3, 2003, that the recitation that an element is "adapted to" perform a function is not a positive limitation but only requires the ability to so perform, is noted; and the additional contention by the Examiner that the

“adapted to” recitation does not constitute a limitation in any patentable sense, is respectfully traversed. It is respectfully submitted that such recitation of “adapted to perform” requires that the Examiner establish that the structure in the reference is “adapted to” perform the recited function, even if the reference does not disclose that the structure does in fact perform the function. In this sense, the “adapted to” language does constitute a recitation that the Examiner must consider in determining patentability. Under the present circumstances, it is respectfully submitted that the Examiner has not established that the structure of Aota, et al. is “adapted to” perform functions as in recitations in the present claims.

In view of the foregoing, and in light of the concurrently filed RCE Transmittal, entry of the present amendments, and reconsideration and allowance of all claims in the application, are respectfully requested.

If the Examiner believes that there are any other points which may be clarified or otherwise disposed of either by telephone discussion or by personal interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Antonelli, Terry, Stout & Kraus,

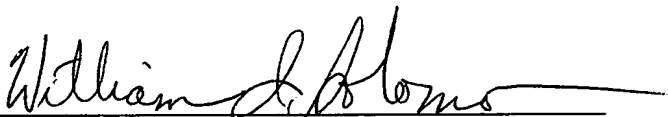
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LLP Deposit Account No. 01-2135 (Docket No. 503.35933VV5), and please credit any excess fees to such Deposit Account.

Respectfully submitted,

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